PROBABILITY
AND
MATHEMATICAL STATISTICS
Vol. 39, Fasc. 1 (2019), pp. 19–38

STRONG LAWS OF LARGE NUMBERS FOR THE SEQUENCE OF THE MAXIMUM OF PARTIAL SUMS OF I.I.D. RANDOM VARIABLES

Shuhua Chang
Deli Li
Andrew Rosalsky

Abstract: Let $0 < p \leq 2$, let $\{X_n;\ n \geq 1\}$ be a sequence of independent copies of a real-valued random variable X, and set $S_n = X_1 + \ldots + X_n$, $n \geq 1$. Motivated by a theorem of Mikosch (1984), this note is devoted to establishing a strong law of large numbers for the sequence $\{\max_{1 \leq k \leq n} |S_k|\,;\ n \geq 1\}$. More specifically, necessary and sufficient conditions are given for

$$\lim_{n \to \infty} \big(\max_{1 \leq k \leq n} |S_k|\big)^{(\log n)^{-1}} = e^{1/p} \text{ a.s.,}$$

where $\log x = \log_e \max\{e, x\}$, $x \geq 0$.

2000 AMS Mathematics Subject Classification: Primary: 60F15; Secondary: 60G50, 60G70.

Keywords and phrases: Theorem of Mikosch, i.i.d. real-valued random variables, maximum of partial sums, strong law of large numbers.

THE FULL TEXT IS AVAILABLE HERE